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REMARKS

The independent claims 1, 6, 11, and 16 have been clarified to amend the previously claimed combination, as exemplified in claim 1, to now include the limitation of:

"encapsulating all of the volume around the semiconductor devices with open encapsulation, leaving the surface of the flat panel heat spreader opposite the substrate externally exposed;"

Support for these amendments is found on page 7, lines 2–3 of the specification.

Independent claims 1 and 11 have been clarified to amend the previously claimed combination, as exemplified in claim 1, to now include the limitation of:

"applying an underfill between the semiconductor devices and the substrate;"

Support for these amendments is found on page 6, lines 16–17 of the specification.

Claim Rejections - 35 USC §102

Claims 1-20 are rejected under 35 U.S.C. 102(e) as being anticipated by Kirloskar et al. (U.S. Patent No. 6,933,176, hereinafter "Kirloskar").

Kirloskar provides a ball grid array integrated circuit package and process in which a semiconductor die is mounted to a surface of a substrate. Collapsible spacers are mounted to a heat spreader, the semiconductor die, and the substrate. The heat spreader is fixed such that the collapsible spacers are disposed between it and the semiconductor die and the substrate. A ball grid array is formed on a second surface of the substrate. The integrated circuit package is then singulated.

Regarding claims 1, 6, 11, 15, 16, and 20, the Applicants respectfully traverse the rejection of these claims since the Applicants' claimed combination, as exemplified in claim 1, now includes the limitation not disclosed in Kirloskar of:

"encapsulating all of the volume around the semiconductor devices with open encapsulation"

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The Examiner states in the Office Action dated September 2, 2005:

"encapsulating the semiconductor devices...(column 4, line 60 – column 5, line 3) with open encapsulation" [deletions for clarity]

However, Kirloskar does not disclose encapsulating all of the volume with encapsulation, but at column 4, line 67 – column 5, line 2, states:

"The molding compound 128 encapsulates the semiconductor die 124, and the collapsible spacers 136 between the heat spreader 132 and the substrate 122" [underlining for clarity]

Thus Kirloskar makes clear that a significant portion of the encapsulated volume is filled by the collapsible spacers rather than the encapsulant. Thus, Kirloskar does not disclose encapsulating all of the volume around the semiconductor devices with open encapsulation as now claimed in all the claims.

It is therefore respectfully submitted that independent claims 1, 6, 11, and 16, and the respective claims 2–5, 7–10, 12–15, and 17–20 depending directly or indirectly therefrom, are not anticipated by Kirloskar under 35 USC §102(e) because:

"Anticipation requires the disclosure in a single prior art reference disclosure of each and every element of the claim under consideration." W.L. Gore & Assocs. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303, 313 (Fed. Cir. 1983) (citing Soundscriber Corp. v. United States, 360 F.2d 954, 960, 148 USPQ 298, 301 (Ct. Cl.), *adopted*, 149 USPQ 640 (Ct. Cl. 1966)), *cert. denied*, 469 U.S. 851 (1984). Carella v. Starlight Archery, 804 F.2d 135, 138, 231 USPQ 644, 646 (Fed. Cir.), *modified on reh'g*, 1 USPQ 2d 1209 (Fed. Cir. 1986); RCA Corp. v. Applied Digital Data Sys., Inc., 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir. 1984).

Withdrawal of the rejection is therefore respectfully requested.

Regarding claims 2, 7, 12, and 17, these dependent claims each depend respectively from independent claims 1, 6, 11, and 16 and are believed to be allowable since they contain all the limitations set forth in the independent claims from which they depend and additionally claim non-obvious combinations thereof. Withdrawal of the rejections of claims 2, 7, 12, and 17 is therefore respectfully requested because of W.L. Gore & Assocs. v. Garlock, Inc. and the other cases cited therewith, *supra*.

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Regarding claims 3, 4, 8, 9, 13, 14, 18, and 19, these dependent claims directly or indirectly each depend respectively from independent claims 1, 6, 11, and 16 and are believed to be allowable since they contain all the limitations set forth in the independent claims from which they depend and additionally claim non-obvious combinations thereof. Withdrawal of the rejections of claims 3, 4, 8, 9, 13, 14, 18, and 19 is therefore respectfully requested because of W.L. Gore & Assocs. v. Garlock, Inc. and the other cases cited therewith, *supra*.

Regarding claims 5 and 10, these dependent claims each indirectly depend respectively from independent claims 1 and 6, and are believed to be allowable since they contain all the limitations set forth in the independent claims from which they depend and additionally claim non-obvious combinations thereof. Withdrawal of the rejections of claims 5 and 10 is therefore respectfully requested because of W.L. Gore & Assocs. v. Garlock, Inc. and the other cases cited therewith, *supra*.

Claims 1-4 and 11-15 are rejected under 35 U.S.C. 102(e) as being anticipated by Combs et al. (U.S. Patent No. 6,734,552, hereinafter "Combs").

Combs provides an enhanced thermal dissipation integrated circuit package having a semiconductor die on a substrate, a heat sink having an extending finger, a thermally conductive element thermally coupled with an interposer between both the semiconductor die and the heat sink, and an encapsulant material encapsulating the thermally conductive element and the heat sink. The thermally conductive element does not directly contact the semiconductor die.

"Regarding claims 1, 11, and 15, the Applicants respectfully traverse the rejection of these claims since the Applicants' claimed combination, as exemplified in claim 1, now includes the limitation not disclosed in Combs of:

"applying an underfill between the semiconductor devices and the substrate"

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Combs does not disclose applying an underfill between the semiconductor devices and the substrate, but at column 4, lines 19–25, states:

“As shown in FIGS. 1 and 2, the semiconductor die 130 may be mounted or attached to the substrate 100 (step 1115) with an adhesive material 115, such as epoxy. However, as shown in FIG. 3, a solder reflow process or other suitable direct chip attachment technique may also be used as an alternative way to attach the semiconductor die 130 to the substrate 100 (step 1115).”

Thus, Combs does not disclose applying an underfill between the semiconductor devices and the substrate as now claimed in claims 1, 11, and 15.

It is therefore respectfully submitted that claims 1, 11, and 15, and the respective claims 2–5, and 12–14, depending directly or indirectly from independent claims 1 and 11, are not anticipated by Combs under 35 USC §102(e) because:

“Anticipation requires the disclosure in a single prior art reference disclosure of each and every element of the claim under consideration.” W.L. Gore & Assocs. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303, 313 (Fed. Cir. 1983) (citing Soundscriber Corp. v. United States, 360 F.2d 954, 960, 148 USPQ 298, 301 (Ct. Cl.), *adopted*, 149 USPQ 640 (Ct. Cl. 1966)), *cert. denied*, 469 U.S. 851 (1984). Carella v. Starlight Archery, 804 F.2d 135, 138, 231 USPQ 644, 646 (Fed. Cir.), *modified on reh’g*, 1 USPQ 2d 1209 (Fed. Cir. 1986); RCA Corp. v. Applied Digital Data Sys., Inc., 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir. 1984).

Withdrawal of the rejection is therefore respectfully requested.

Regarding claims 2 and 12, these dependent claims each depend respectively from independent claims 1 and 11 and are believed to be allowable since they contain all the limitations set forth in the independent claims from which they depend and additionally claim non-obvious combinations thereof. Withdrawal of the rejections of claims 2 and 12 is therefore respectfully requested because of W.L. Gore & Assocs. v. Garlock, Inc. and the other cases cited therewith, *supra*.

Regarding claims 3, 4, 13, and 14, these dependent claims directly or indirectly each depend respectively from independent claims 1 and 11, and are believed to be allowable since they contain all the limitations set forth in the independent claims from which they depend

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and additionally claim non-obvious combinations thereof. Withdrawal of the rejections of claims 3, 4, 13, and 14 is therefore respectfully requested because of W.L. Gore & Assocs. v. Garlock, Inc. and the other cases cited therewith, *supra*.

Conclusion

In view of the above, it is submitted that the claims are in condition for allowance and reconsideration of the rejections is respectfully requested. Allowance of claims 1-20 at an early date is solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including any extension of time fees, to Deposit Account No. 50-0374 and please credit any excess fees to such deposit account.

Respectfully submitted,



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